

Greetings and welcome to the **NOVEMBER 2015** edition of the WDFW Climate News Digest. Our purpose is to provide highlights of relevant climate change news, events and resources for WDFW staff. Feedback or suggestions for items to include in future editions are much appreciated – many *thanks* to those who have sent links and references and please keep them coming. Note that previous editions of the newsletter are now stored on the [Habitat Program Sharepoint](#) site and on the agency's [climate change web page](#), (scheduled for an update soon!)

Thanks for contributions this month from Bob Vadas, Bruce Botka, Wendy Connally and Dan Siemann (DNR).

Other sources for articles include: Point Blue Conservation Science, NPLCC Climate Science Digest, Climate.gov, NOAA Climate Newsletter. Contact Lynn to subscribe directly to any of these.

WHAT'S HAPPENING AT WDFW?

Are you working on a project that may be affected by climate change? Have you considered or included climate change in research proposals, workshops or other activities? Please be in touch to share your experience!

CLIMATE ADAPTATION AT OTHER ORGANIZATIONS

Taking Action: Boosting Ecosystem Resilience in the Southwest's Sky Islands – *from Climate.gov*

Conservation organizations teamed up to document the climate vulnerability of mountain springs that support unique ecosystems. Now, the Alliance they formed facilitates restoration work to enhance habitats and improve resiliency. [See how others are building resilience.](#)

The Swinomish Indian Tribal Community Prepares for Climate Change – *from Climate.gov* **Transitions and Traditions: Adaptation on Tribal Lands** – short video with link to more information

Quinault Nation President Fawn Sharp Discusses Steps to Stemming the Tide of Climate Change – *from Indian Country Today*

Sharp appeared before the House Interior Appropriations Subcommittee in Washington, D.C. on March 24 to request federal funding to support the relocation of homes, public buildings and schools out of a tsunami zone in the coastal village of Taholah. Her testimony came a week after the Affiliated Tribes of Northwest Indians, of which she is president, hosted a summit, “Asserting Native Resilience – Protecting and Enhancing Tribal Resources and Sovereignty in the face of Climate Change.”

Climate Change Preparedness Plan for the North Olympic Peninsula – *from Climate Adaptation Knowledge Exchange*

It is increasingly apparent that the global climate is rapidly changing and that these changes will affect the people, ecosystems, economy, and culture of the North Olympic Peninsula. These changes will affect the natural resources and livelihoods of the people of the North Olympic Peninsula, as well as the entire regional economy. Climate change exerts its influence on human lives both directly (from extreme weather events) and indirectly (through ecosystem shifts and associated impacts to the natural and built environment). This Plan utilizes a regional planning perspective to understand and prepare for Climate Change's impact to Ecosystems, Water Supplies, and Critical Infrastructure on the North Olympic Peninsula.

NOAA Funding Awards

The National Centers for Coastal Ocean Science has awarded \$2.1 million to improve observation, forecasting, and mitigation of harmful algal blooms and hypoxia. [Read the NCCOS release »](#)
NOAA has awarded \$1.3 million to predict coastal acidification impacts to commercial species and vulnerable habitats.
[Read the NOAA release »](#)

Northwest Climate Science Center Releases Annual Workplan (attached)

The Northwest Climate Science Center (NW CSC) was established by the Department of the Interior (DOI) in 2010 to provide objective scientific information and tools that Northwest managers of land, water, wildlife, and cultural resources can use to anticipate, monitor, and adapt to climate change. The NW CSC is one of eight regional climate science centers managed by the U.S. Geological Survey (USGS) National Climate Change and Wildlife Science Center (NCCWSC) and is a federally-led research collaboration partnered with three primary universities: Oregon State University, the University of Idaho, and the University of Washington.

RESOURCES

EPA launches new tool to support community interest in green infrastructure

As part of a commitment to make a visible difference in communities, EPA is releasing a new web-based tool that helps local officials and other community members consider the benefits and uses of green infrastructure. Green infrastructure relies on vegetation, soils, and natural processes to manage stormwater and create healthier urban environments. The Green Infrastructure Wizard, or GIWiz, responds to growing community interest in using green infrastructure as a means of addressing water quality and a range of other local goals.

NOAA online map update offers improved coastal observations and forecasts Climate Change Impacts

NOAA has upgraded nowCOAST, a GIS-based online map service providing more frequently updated ocean observations along with coastal and marine weather forecasts. The new version also offers a visual point-and-click access to 60 NOAA data products and services. Users can reach the site at nowcoast.noaa.gov.
[Learn more »](#)

USFS maps cold water refugia for salmonids

The Climate Shield website hosts geospatial data and related information that describes specific locations of cold-water refuge streams for native Cutthroat Trout and Bull Trout across the northwestern U.S.

[Article here](#)

[Website here](#)

Identifying resilient terrestrial landscapes in the Pacific Northwest – a webinar recording sponsored by the Great Northern Landscape Conservation Cooperative is now available. The purpose of this project, funded by the Doris Duke Charitable Foundation, is to identify the most resilient sites in the Northwest that will collectively and individually best sustain native biodiversity even as the changing climate alters current distribution patterns. The central idea is that by mapping key geophysical features and evaluating them for landscape characteristics that buffer against climate change, we can guide future conservation investments.
[View recording, slides, and project resources](#)

Climate Data - *from Climate.gov*

Explore this tool to access simple graphs of Climate Normal data for temperature and precipitation for 1981-2010 from weather stations across the country.

LEARNING OPPORTUNITIES

November 4-5 — Sixth Annual Northwest Climate Conference – Coeur d’Alene, Idaho

The NW Climate Conference (formerly known as the Pacific Northwest Climate Science Conference) annually brings together more than 250 researchers and practitioners from around the region to discuss scientific results, challenges, and solutions related to the impacts of climate on people, natural resources, and infrastructure in the Northwest. It is the region's premier opportunity for a cross-disciplinary exchange of knowledge and ideas about regional climate, climate impacts, and climate adaptation science and practice.

November 9, 10:15 Pacific, Using "Living" Flood Maps to Prepare Coastal Communities

This webinar hosted by the Security & Sustainability Forum, will focus on how to effectively communicate coastal climate risks to homeowners, businesses and governments in order to make them better prepared and more resilient to floods. The panel will address tidal and storm flood issues, as well as sea-level rise and the use of innovative data tools to predict and prepare for extreme weather events in coastal communities.

November 13 – 10:00 to 1:00 pm in Olympia – Workshop: Culvert Sizing and Climate Change

WDFW is hosting a workshop to share final results of a project to explore options for integrating future climate projections into agency culvert design and permitting processes. For more information or to reserve a spot, please contact Lynn Helbrecht at lynn.helbrecht@dfw.wa.gov or (360) 902-2238.

November 16th from 12-1pm, Department of Health “Green Bag” Series, “Including Coast Salish Indigenous Health Priorities in Climate Change Planning”

Jamie Donatuto and Larry Campbell, Swinomish Tribe staff, will talk about their climate change adaptation planning and the climate change health indicators they’ve developed. Join us on November 16 in person at the Tumwater campus or via [webinar](#). Email ann.butler@doh.wa.gov for more information.

November 17th - 12:00-1:00 (Pacific), EPA Climate Change Speaker Series: “The Paris Agreement On Climate Change: What Can We Expect And Will It Be Enough?”, Derik Broekhoff, Stockholm Environmental Institute. Since 1994, UN negotiators have been meeting annually to agree on a globally coordinated policy response to the threat of climate change. Derik will talk about what to expect from the November Paris Conference – and whether the nations of the world can fulfill their 1992 pledge to “prevent dangerous anthropogenic interference with the climate system.” Call in: 1-866-299-3188, Code: 206-553-1597#, Adobe Connect: <https://epa.connectsolutions.com/r3y572rrhby/>
Information: Michael Cox (206-553-1597).

December 1-3 – “Climate Adaptation for Coastal Communities”, a new course taught by national experts from NOAA and held at the Padilla Bay Reserve from 9 am-4:30 pm. This three-day course will help you recognize the variability in climate’s influence on coastal (and inland shoreline) communities, Identify opportunities to leverage a range of governance mechanisms to integrate adaptation strategies into their existing efforts, examine methods for conducting hazard, vulnerability, and risk assessment as it relates to climate change and more. The cost of the class is \$195 and includes lunch and materials. To register, please go to <http://www.coastaltraining-wa.org>.

CLIMATE SCIENCE NEWS

Oncoming El Niño likely to continue species shakeup in Pacific – *From NOAA Fisheries*

The emerging El Niño climate pattern that is warming the tropical Pacific Ocean is likely to continue—and could even increase—the appearance of marine species in unfamiliar places along the West Coast. This trend started with a vast "warm blob" of high temperature waters that has dominated the Northeast Pacific since 2014.

Comparing Two Generations of Climate Model Simulations and Projections of Regional Climate

Processes for North America – *From NOAA*

NOAA has released a report comparing results for North America from two generations of climate model simulations. The report, titled "Regional Climate Processes and Projections for North America: CMIP3/CMIP5 Differences, Attribution and Outstanding Issues," compares simulations of historical and future climate in North America produced by phases 3 and 5 of the Coupled Model Intercomparison Project (CMIP3 and CMIP5, respectively).

[Access the full report »](#)

Scientists identify climate 'tipping points' – *From Science Daily*

An international team of scientists have identified potential 'tipping points' where abrupt regional climate shifts could occur due to global warming. In the new study, published in Proceedings of the National Academy of Sciences (PNAS), the scientists found evidence of 41 cases of regional abrupt changes in the ocean, sea ice, snow cover, permafrost and terrestrial biosphere. Many of these events occur for global warming levels of less than two degrees, a threshold sometimes presented as a safe limit.

Changing Winds Explain Most Pacific Coast Warming - *From NOAA Southwest Fisheries Science Center*

Changes in winds over the eastern Pacific Ocean explain most of the warming trend along the West Coast of North America in the last century, according to a new analysis published in the Proceedings of the [National Academy of Sciences](#). Similar atmospheric shifts are known to drive fluctuations in Pacific climate over decades in the form of the Pacific Decadal Oscillation (PDO), a long-recognized pattern of seesawing ocean temperatures. The new research indicates that similar changes in regional pressure and winds can also drive trends in sea surface and coastal air temperatures that extend over a century or more. "Surface winds and wind-driven ocean currents have large effects on temperatures in and around the northeast Pacific Ocean; they dominate the overall temperature variability and also account for a large fraction of the warming trend," said Jim Johnstone, formerly of the NOAA Joint Institute for the Study of the Atmosphere and Ocean at the University of Washington and lead author of the research. "West Coast sea surface and coastal air temperatures evolved in lockstep with changing patterns of atmospheric pressure and winds."

SPECIES AND HABITATS

Forest health in a changing world – *From the IB Times*

A new issue of the journal *Science* focuses on climate change impacts on forests and how forest health is already in the process of changing. According to Nathan Stephenson, USGS ecologist and co-author of the study, temperate forests are already showing signs of warming temperatures, such as increases in tree deaths. The papers in this issue explore changes in tropical, temperate, boreal and managed forests and describe processes of shifting land use, climate change, biodiversity, changes in the frequency and intensity of extreme events, and disturbance regimes. The issue asks broadly how forest health is and should be defined, and how to identify forest stresses that make forests particularly vulnerable to climate change.

A Nation Parched for Research on Ecological Drought - *From the Climate Science Centers*

While prolonged drought with widespread impacts on food and water supplies for people is among the oldest stories in human history, ecological drought has only been recently recognized as an important climate stressor for fish and wildlife species. The Climate Science Centers and the National Climate Change

and Wildlife Science Center are studying the effects of drought nationwide to help decision-makers understand this issue.

Adaptive potential of a Pacific salmon challenged by climate change – *From the Nature of Climate Change*

This article provides evidence that a Pacific salmon has both physiological and genetic capacities to increase its thermal tolerance in response to rising temperatures. However, a lack of both plasticity and genetic variation was found for the arrhythmic temperature of the heart, constraining this upper thermal limit to a maximum of 24.5 ± 2.2 °C. Linking this constraint on thermal tolerance with present-day river temperatures and projected warming scenarios⁵, we predict a 17% chance of catastrophic loss in the population by 2100 based on the average warming projection, with this chance increasing to 98% in the maximum warming scenario.

Anticipated Effects of Climate Change on Coastal Upwelling Ecosystems – *From Current Climate Change Report*

(from the abstract): Ecosystem productivity in coastal ocean upwelling systems is threatened by climate change. Increases in spring and summer upwelling intensity, and associated increases in the rate of offshore advection, are expected. While this could counter effects of habitat warming, it could also lead to more frequent hypoxic events and lower densities of suitable-sized food particles for fish larvae.

The Rapid and Startling Decline Of World's Vast Boreal Forests – *From Yale 360*

Scientists are becoming increasingly concerned about the fate of the huge boreal forest that spans from Scandinavia to northern Canada. Unprecedented warming in the region is jeopardizing the future of a critical ecosystem that makes up nearly a third of the earth's forest cover.

Scientists identify areas of global ocean most vulnerable to ocean acidification – *From NOAA*

New NOAA-led research maps the distribution of aragonite saturation state in both surface and subsurface waters of the global ocean and provides further evidence that ocean acidification is happening on a global scale.

[Learn more »](#)

Climate change could benefit northern lizards – *From Science Daily*

Higher temperatures result in Swedish sand lizards laying their eggs earlier, which leads to better fitness and survival in their offspring, according to new research.

Gabriella Ljungström, Erik Wapstra, Mats Olsson. Sand lizard (*Lacerta agilis*) phenology in a warming world.

Many young fish moving north with adults as climate changes – *From Science Daily*

Numerous studies in the Northeast US have shown that adult marine fish distributions are changing, but few studies have looked at the early life stages of those adult fish to see what is happening to them over time. A new study has some answers, finding that distributions of young stages and the timing of the life cycle of many fish species are also changing.

Sex and sea turtles: New study reveals impact of climate change, sea level rise – *From Science Daily*

Because sea turtles don't have an X or Y chromosome, their sex is defined during development by the incubation environment. Warmer conditions produce females and cooler conditions produce males. The shift in climate is shifting turtles as well, because as the temperature of their nests change so do their reproduction patterns.

POLICY AND MANAGEMENT - MITIGATION AND ADAPTATION

How Washington Transformed its Dying Oyster Industry into a Success Story

From Climate Progress, a summary of how Washington Oyster growers teamed with scientists and government to buffer their operations against the increasing acidity of waters (for the time being) and become leaders in the country.

Idaho indicators for Climate Change (attached)

Finer, local- to regional-scale information is needed for creating specific, place-based planning and adaption efforts. Here the development of an indicator-focused climate change assessment in Idaho is described. This interdisciplinary framework couples end users' data needs with observed, biophysical changes at local to regional scales.

Teaching the Truth About Climate Change – *From NYTimes Editorial Board*

"Misinformation about climate change is distressingly common in the United States — a 2014 Yale study found that 35 percent of Americans believe that global warming is caused mostly by natural phenomena rather than human activity, and 34 percent think there is a lot of disagreement among scientists about whether global warming is even happening. One way to stop the spread of this misinformation is to teach children about climate change. The Next Generation Science Standards offer one guide for doing so. Developed by a committee of scientists and education experts and honed by teams in 26 states before their release in 2013, the standards set forth a variety of scientific practices and concepts for students from kindergarten through 12th grade to master."

New Federal Policy Guidance On Natural Infrastructure – *From the Whitehouse.gov*

-- the memo directs all Federal agencies to incorporate the value of natural, or "green," infrastructure and ecosystem services into Federal planning and decision making. This builds on previous efforts such as guidance for GHG and climate change impacts when developing NEPA reviews; and Executive Orders governing federal agency actions and obligations to reduce environmental and GHG footprints.

How 'Third Way' Technologies Can Help Turn Tide on Climate

In a Yale Environment 360 interview, Australian scientist and author Tim Flannery explains how the development of technologies that mimic the earth's natural carbon-removing processes could provide a critical tool for slowing global warming.

It's time to change the way we talk about climate change

An astrophysics professor at Rochester University explores the notion that climate change is not our fault.

Governor Brown Signs Climate Resilience Legislation

Adapted from The Nature Conservancy/California, Climate-Smart Policy Listserve

California has passed broad sweeping climate adaptation legislation. The package of resilience bills hits all levels of government: state, regional, and local. They will enhance local climate planning efforts, coordinate statewide adaptation efforts, update the state's adaptation plans and implement the strategies called for in the plans, and create a clearinghouse for climate research. The bills are summarized below:

SB 379 (JACKSON) LAND USE: GENERAL PLAN: SAFETY ELEMENT

Requires cities and counties to include a climate vulnerability assessment and adaptation strategies in the Safety Element of their County General Plan, beginning January 1, 2017 or upon the next revision of the Hazard Mitigation Plan. Furthermore, it would require the plan to include a set of adaptation and resilience goals, policies, and objectives based on the vulnerability assessment, as well as feasible implementation measures, including the identification of natural infrastructure actions that may be used in adaptation projects. Planning this way would enhance the resiliency of California's communities to climate change and ensure that local governments are planning early.

AB 1482 (GORDON) CLIMATE RESILIENCE

Establishes a framework to coordinate climate adaptation efforts across state agencies and departments. AB 1482 requires the California Natural Resources Agency (CNRA), in coordination with the Strategic Growth Council, to oversee and coordinate state agency actions to adapt to climate change.

SB 246 (WIECKOWSKI) CLIMATE CHANGE ADAPTATION

Fosters climate adaptation planning at the local level by establishing the Climate Adaptation and Resiliency Program to be administered by the Office of Planning and Research (OPR) to coordinate state, regional, and local agency adaptation efforts. SB 246 also requires the Office of Emergency Services, in coordination with the Natural Resources Agency and OPR, to update the state's Adaptation Planning Guide (APG) to provide tools and guidance to local governments in implementing climate adaptation and climate resiliency projects.

For full text of the bills, visit: <http://leginfo.legislature.ca.gov>